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Nontraumatic Embolic Clostridial Gas Gangrene

Involvement of an Extremity Associated With Endoscopy

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THE NON-TRAUMATIC DEVELOPMENT of clostridial gas gangrene in an extremity is an unusual and generally lethal occurrence; consequently, rapid diagnosis is essential. Only 22 cases have been described previously. In such cases the clostridial organisms presumably are transported to a peripheral site from the gastrointestinal tract, either directly or through metastatic transmission.

Report of a Case

A 27-year-old woman was seen in consultation by the orthopedic service at Stanford University Medical Center when she was found to have a pulseless, cold, cyanotic, right upper extremity.

In 1971 a diagnosis of nodular sclerosing Hodgkin disease, stage III-A, had been made. The patient was given multiple treatments of irradiation and did quite well until July 1976, when fever and explosive, watery diarrhea developed. When admitted to the medical center her temperature was 38.8°C (101.8°F), pulse 112, and blood pressure 104/70. The lungs were clear, and the heart had a regular sinus rhythm with a grade II/VI systolic ejection murmur. Examination of the abdomen showed no abnormalities. Examination of the extremities showed no edema, cyanosis, clubbing or tenderness, and all pulses were present bilaterally. The leukocyte count was 12,500; hematocrit reading, 36.9 percent, and platelet count, 230,000. The level of alkaline phosphate was 876, bilirubin, 4.4; albumin, 3.3; lactate dehydrogenase, 471; serum glutamic oxaloacetic transaminase, 277; leucine aminopeptidase, 189, and nucleotidase, 172. The sedimentation rate was 53. A liver scan, rose bengal study, and abdominal ultrasound examination all gave findings within normal limits. Cultures of urine, sputum, stool and blood specimens were negative. During the patient's hospital stay, fevers spiked daily to 39°C. A liver biopsy study showed extensive inflammatory reaction surrounding the portal triads. Twenty-four hours later bloody stools developed. A barium enema study showed thickened folds in the cecum and ascending colon. A bone marrow aspirate showed decreased megakaryocytes with moderate hypoplasia. The diarrhea persisted, associated with a decreasing hematocrit reading and a platelet count of 8,000.

Transfusion was carried out with packed cells and platelets. An upper gastrointestinal series showed impaired distensibility of the distal stomach and antrum. On the day before development of a cyanotic pulseless extremity (13 days after admission), endoscopy was carried out. The

Figure 1.—Roentgenogram of the right arm shows the gas in the tissues.

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stomach and duodenum appeared erythematous with patchy hemorrhages and ulceration. The duodenal biopsy specimens showed Gram-positive rods; there was no gas in the tissue, however. During the day, dyspnea and pitting edema of the lower extremity developed. An x-ray study of the chest showed a pleural effusion and interstitial edema. A left thoracentesis yielded 700 ml of fluid. The patient remained febrile at 38°C (100.4°F), and her pulse rate gradually increased.

An intravenous line was placed in the patient's right arm. Approximately 12 hours later the patient complained of some moderate pain. Four hours later, the arm became more painful and was swollen and erythematous. A discrete nummular lesion with a dusky appearance was seen on the volar surface, just opposite the intravenous site. However, it was specifically noted that this area was not adjacent to the site of the intravenous line. Three hours later, the arm was swollen to the level of the elbow and the intravenous line was removed, but the patient's arm became progressively more painful and at 7:00 a.m. was noted to be crepitant, mottled, discolored, pulseless, and lacking sensation or motor function (Figure 1). Aspiration from a vesicle revealed Gram-positive rods.

At surgical operation, purpuric lesions extending the full length of the right arm, including the right breast and right lateral chest margin, were present (Figure 2). There was extensive necrosis of the entire deltoid, biceps and forearm muscles. A musty smelling gas exuded from all muscular compartments that had been released by the fasciotomy. A forequarter amputation was carried out. Povidone iodine soaked sponges were placed in the wound and the edges were loosely approximated with a bulky dressing. A dopamine drip was required to maintain blood pressure, and a volume respirator to maintain respiratory function. On the second postoperative day, respiratory function could not be maintained and the patient died.

At autopsy lymphomatous, nodular involvement of the small and large bowel were noted,

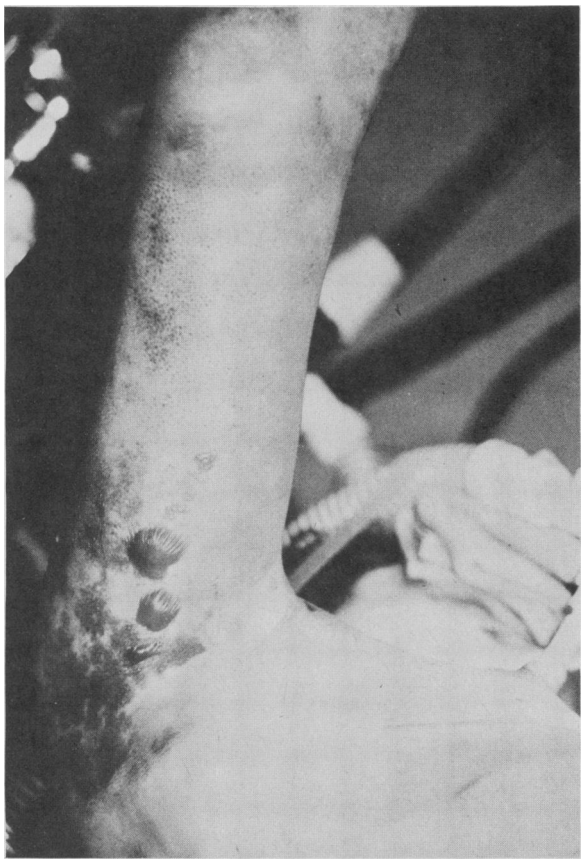

Figure 2.—Vesicular lesions cover the axilla and entire arm.

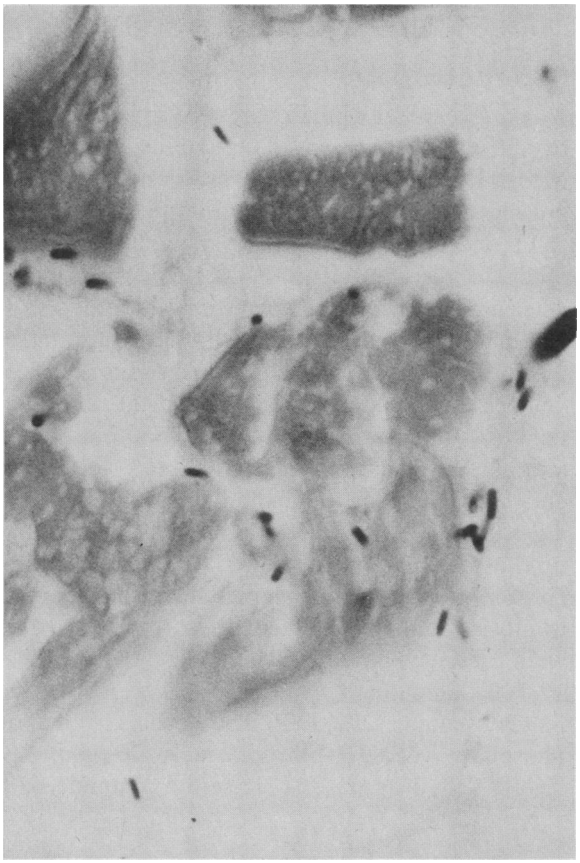

Figure 3.—Microscopic examination of the muscle shows Gram-positive rods.

with multiple ulcerations. The cecum was particularly involved with the nodular lesions. Microscopic examination of the amputated extremity showed widespread myonecrosis. Prominent interstitial edema with large Gram-positive rods appeared in the muscle (Figure 3); these were identified as Clostridium perfringens.

Comment

Gas gangrene is a rare infection caused primarily by organisms of the genus Clostridium, an anaerobic microaerophilic Gram-positive rod which produces endospores.[1,2] Approximately 30 percent of war wounds harbor Clostridium; however, actual clostridial gas gangrene infection develops in less than 5 percent of these wounds. As Ogilvie has noted, the development of gas gangrene is associated with a particular opportunity, rather than a particular organism.[3]

While most cases of gas gangrene have been found in dirty, necrotic, open wounds, and in cases of criminal abortions and contaminated abdominal operations, a growing number of cases have been documented in which no open trauma occurred (Table 1).[4-19] In addition, more than 200 cases of gas gangrene complicating intramuscular injections, particularly of adrenalin, have been documented.[1,20]

Clostridial sepsis has been described unassociated with any open trauma.[4,21-31] In most of these a malignant condition has been found with epithelial ulcerations of the gastrointestinal tract frequently present.

Under normal circumstances, the gastrointestinal tract, particularly the colon, is a repository for clostridial organisms. However, infection does not result unless suitable anaerobic conditions develop. In the compromised host, as the result of neoplastic or hematologic disease, the gastrointestinal tract may serve as the portal of entry for infection with Clostridium organisms.[1] This may result in sepsis or focal involvement of an extremity. Minimal trauma may furnish the decreased oxidation-reduction potential necessary for the multiplication of the organism.

Because gas gangrene is usually unsuspected unless associated with open trauma, the failure to diagnose this condition promptly has probably contributed to the poor prognosis in almost all cases. In one case the subcutaneous emphysema of the thigh was noted only at autopsy.[15]

The patient presented in this report had Hodgkin disease and gas gangrene of the right arm developed. While the gas gangrene developed following endoscopy, and duodenal biopsy, this could certainly not be implicated with any cer-

TABLE 1.—*Case Reports of Nontraumatic Gas Gangrene*

Author	*Year*	*Primary Diagnosis*	*Extremity*	*Organism*	*Complications*	*Course*
Gordon[7]	1936	Appendiceal abscess	Thigh	Perfringens	.....	Died
Wyman[19]	1949	Carcinoma of colon	Thigh	.....	.....	Died
Kimball and Rawson[11]	1952	Carcinoma of colon	Thigh	.....	.....	Died
		Carcinoma of colon	Arm	.....	.....	....
Valentine[18]	1957	Adenocarcinoma cecum	Hip	Septicum	.....	Died
Smucker et al[16]	1960	Adenocarcinoma cecum	Thigh and buttocks	Perfringens	Appendicitis	Died
Soscia and Grace[17]	1965	Necrotizing pancreatitis	Leg	Perfringens	Acute cholecystitis	Died
Isenberg[9]	1966	Diabetes	Thigh	Perfringens	.....	Died
Rose and Bukosky[15]	1966	Duodenal ulcer	Thigh	Perfringens	.....	....
Gazzaniga[6]	1967	Adenocarcinoma cecum	Arm	Perfringens	Diabetes	Died
Marty and Filler[12]	1969	Adenocarcinoma colon	Forearm	Perfringens	Diabetes	Died
		Duodenal ulcer	Leg	Perfringens	Diabetic ketoacidosis	Died
Alpern and Dowell[4]	1969	Cyclic neutropenia	Thigh	Septicum	.....	Lived
El Dahla[5]	1971	Ischiorectal abscess	Leg	Perfringens	.....	Died
Kapusta et al[10]	1972	Neutropenia	Thigh	Perfringens and septicum	.....	Lived
Poretz et al[14]	1974	Adenocarcinoma colon	Thigh	Septicum	.....	Died
Mzabi et al[13]	1975	Adenocarcinoma cecum	Leg and foot	Septicum	Diabetes, atherosclerosis	Died
		Adenocarcinoma cecum	Thigh	Tertium	Diabetes	Died
Hedstrom[8]	1975	Perforated intestine	Thigh	.....	.....	....
		Perforated intestine	Thigh	.....	.....	....
		Acute leukemia	Thigh	.....	.....	....

tainty. A compromised mucosa was shown, however. The infection of the right upper extremity was unassociated with any known trauma or direct extension from the gastrointestinal tract. As in almost all other cases, the disease followed a rapid, fatal course.

Summary

A case of nontraumatic gas gangrene of the right arm is presented in a patient with Hodgkin disease. Endoscopy had been carried out on the previous day, with Gram-positive rods shown in the duodenal biopsy specimen. In all, 22 cases of nontraumatic gas gangrene of the extremities have been described, with a malignancy of the gastrointestinal tract present in most of them.

This case is presented to alert surgeons to the possibility of nontraumatic clostridial gas gangrene in any patient in whom an unexplained painful extremity suddenly develops, particularly in a patient with a gastrointestinal neoplasm or ulceration. Early diagnosis and treatment may improve the prognosis, even in the compromised host.

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Tennis Elbow as a Complication of Pollicization of the Index Finger

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THE LAST 30 YEARS have seen dramatic advances in surgical procedures of the hand. Surgeons have developed techniques for the reattachment of amputated digits[1-3] and the autotransplantation of intact digits.[4,5] New thumbs can now be created by autotransplantation of the hallux[5] or pollicization of the index finger.[6]

We recently saw a patient who had undergone a pollicization procedure of his left index finger following a traumatic amputation of his left thumb. Although the local results of the operation were excellent, severe, recurrent left lateral epicondylitis had developed. The development of epicondylitis in a patient whose thumb and fingers are extended by the same extensor muscles has not, to our knowledge, been previously reported.

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